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EMISSION RESULTS FROM AN AUTOMOBILE USING THE FRANTZ VAPOR INJECTOR

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16. Abstracts: Emission tests were run on the Frantz Vapor Injector retrofit system. This device was a vapor injector system which added a mixture of air and a vaporized chemical to the positive crankcase ventilation line with the amount of vapor-air mixture dependent on the manifold vacuum. The device was tested on a 1968 Ford Falcon equipped with a 200 cu. in. six-cylinder engine and manual transmission. The vehicle was tested under three differing conditions, using two different test procedures. The first four tests were conducted with the vapor injector as installed by Frantz; two using the 1972 Federal emission test procedure (LA4), and two using the 1971 Federal emission test procedure (7-mode). One 7-mode and one LA4 were run after removing the vapor injector. Test results indicate that the Frantz Vapor Injector system shows some emission reduction on the LA4 test over baseline, but the significance of the result is unknown due to a high variability in the data. The best results were obtained from the vapor injector by removing the fluid. The baseline 7-mode tests gave lower emission values than the test with the vapor injector installed.

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Nitrogen oxides
Carbon monoxide

17b. Identifiers/Open-Ended Terms

Retrofit devices
Frantz Vapor Injector System
Federal Emission Test Procedure (1972)
Federal Emission Test Procedure (1971)

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Background

As part of a continuing evaluation of retrofit devices for used cars, emission tests on the Frantz Vapor Injector system was run. Emission reductions for hydrocarbon (HC) of up to 37%, carbon monoxide (CO) of up to 44%, and nitrogen oxide of up to 35% were claimed. The device was installed on a vehicle supplied by a Louisville, Kentucky newspaper at the newspaper's request. The installer was not told of the purpose of the installation and it is assumed that this was a typical conversion.

Device

The device tested was a vapor injector system produced by the Sky Corporation, Stockton, California. This system added a mixture of air and a vaporized chemical to the positive crankcase ventilation line with the amount of vapor-air mixture dependent on the manifold vacuum. .

Test Program

The device was tested on a 1968 Ford Falcon equipped with a 200 cubic-inch six cylinder engine and manual transmission. This engine was also equipped with the original air injection pump. Two different test procedures were used in evaluating the emissions from this device and the vehicle was tested under three differing conditions. The first four tests were with the vapor injector as installed by Frantz and the recommended fluid used. Two of these used the 1972 Federal emission test procedure (LA4) which is a non-repetative self-weighting test using the constand volume sampling system. This procedure required the collection of a representative sample of the total exhaust from the vehicle. The second two tests used the 1971 Federal emission test procedure (7-mode) which is a continuous tailpipe monitoring test using a repetative driving cycle. In this test certain portions of the exhaust are measured and weighted according to the amount of driving typical under these conditions. For both sets of tests, carbon monoxide (CO) and carbon dioxide (CO_2) were measured using nondispersive infrared (NDIR). For the 7-mode tests hydrocarbon (HC) and oxides of nitrogen (NOx) were analyzed using NDIR also. In the LA4 tests HC was measured using flame ionization detector (FID) and NOx using chemiluminesence. The amount of fuel used for each test was measured and report in kilograms. A single 7-mode test using the injector with e fluid removed was run to determine the effect of the fluid.

One 7-mode and one LA4 were run after removing the vapor injector and returning the vehicle to baseline condition.

Results

The results from all tests were reported in Table I with each condition of test identified. Emission results are reported in grams per mile (GPM). As the 7-mode test was the only one used under all three conditions, the results from this test are summarized below:

	HC gpm	CO gpm	NOx gpm	Fuel used kg
Vapor Injector with fluid	2.8	26	4.0	1.1
Vapor Injector no fluid	2.3	24	2.7	1.1
Baseline	2.7	28	3.7	1.1

The lowest results came from using the vapor injector with the fluid removed. The next lowest condition was the baseline with emissions from the vapor injector with fluid highest on two out of three pollutants. Fuel used for all tests was identical.

The LA4 results showed a considerable amount of variation and are therefore not as reliable as the 7-mode answers. The reasons for variability are unknown but indicate an emission reduction with the device installed. The LA4 test with no fluid was voided due to operation error. In order to evaluate this device on the LA4 procedure at least six more tests would be required.

Conclusions

1. The Frantz Vapor Injector system shows some emission reduction on the LA4 test over baseline but the significance of the answers is unknown due to a high variability in the data. Insufficient time was available to determine the cause of this emission variability.

2. The best results were obtained from the vapor injector by removing the fluid.

3. The baseline 7-mode tests gave lower emission values than the test with the vapor injector installed.

4. The effectiveness of the vapor injector device for reducing emissions is apparently a function of the air bled into the manifold. This results in a leaner air-fuel mixture.

Table I

Emission Results from a 1968 Ford Falcon

	HC gpm	CO gpm	NOx gpm	Fuel used (total kg)
		(with vapor injector installed)		
LA4	2.9	27	4.0	1.4
LA4	2.3	28	2.0	1.3
7-mode	2.5	25	4.0	1.1
7-mode	3.1	27	3.9	1.1
		(with vapor injector-fluid removed)		
7-mode	2.3	24	2.7	1.1
		(with vapor injector removed - baseline)		
LA4	3.5	38	4.0	1.6
7-mode	2.7	28	3.7	1.1